

from usage commensurate with engineering expectations.

Under traditional usage circumstances, we can understand why LECs throughout the nation advertise and encourage the sale of second lines. Such sales generate profit -- the goal of any corporation (including Economics and Technology, Inc. and those corporations that belong to the Internet Access Coalition). Inappropriate, subsidized pricing results in abuse of the PSTN resource and reduces the profitability of these second lines, eliminating the possibility of funding equipment upgrades for data traffic.

Misunderstanding of Technology

CONTRADICTIONARY POSITIONS

In their discussion of the switch blocking caused by the Commercial Internet Service Industry, Selwyn and Laszlo argue a position contradictory to rational corporate behavior. They suggest that "the telephone company can reduce the number of lines that it terminates on an individual LCM (Line Concentration Module), such that up to half of the total lines in the LCM can be off-hook, rather than only about 1/4th of them in the fully loaded configuration."⁵³ However, they acknowledge in their footnote to this engineering recommendation "reducing the number of lines terminating at an LCM ...will result in some increase in the average cost of actual line termination, since the cost of the LCM itself ...will have to be spread across fewer lines."

The position of the telephone industry in general and the Federal Communications Commission is quite clear in this regard. Equipment should be used to the fullest extent possible and fill-rates should not be manipulated. Even if this were not the case, the argument merely emphasizes the paradox of current pricing. The telephone company should not invest resources specifically for the ISPs without compensation for those investments.

⁵³ Selwyn and Laszlo, January 22, 1997, pages 9 and 10.

THE "LOCALIZED" PROBLEM

Selwyn and Laszlo indict the empirical evidence provided by professionals from several LECs and Bellcore, a leading telecommunications research center of global merit. They note that these public corporations "limited their examinations and measurement solely to the particular end offices that serve ESPs, thereby obtaining a 'worst case' picture of the relative impact of ESP/ISP traffic."⁵⁴ That these problems are localized in source is exactly the point made by the operating companies, for two reasons.

First, the localized nature of the problem is *de facto* evidence that the sources of the impacts are the vendors in the Internet service industry. The LECs do not object to implementing appropriate corrective technologies to assist these businesses. However, they do object to providing remediation without compensation. The LECs also object to forcing other customers to shoulder this financial burden for a service they do not use. They recognize that this approach to financing a commercial enterprise is not in the public's best interests. They also recognize that the era of cross-subsidy is over and that the temporary exemption granted more than a dozen years ago should end with that era. Moreover, the LECs recognize that no one should be forced to pay someone else's bills. Indeed, Selwyn and Laszlo acknowledge that "the notion that the cost causers should pay for the costs they impose upon local telephone networks is hard to dispute."⁵⁵

Second, the localized nature of the problem at the switch does affect other subscribers in several ways. First, the residential subscribers connected to that switch are affected by the switch domination of the Commercial Internet Service Industry vendor. Second, the principles of tandem switching assume that a switch will be available, which may not be the case if the tandem switch is jammed with traffic. Third, the implicit assumption that a local problem has only local effects is erroneous. As we know from instances of stream pollution, radioactive waste sites and similar point sources of pollution, localized

⁵⁴ Selwyn and Laszlo, January 22, 1997, page 7, footnote 12.

⁵⁵ Selwyn and Laszlo, January 22, 1997, page 2.

problems often do have widespread consequences. In this case, the fact that the telephone system as a whole displays still impressive performance statistics is being used as a mask for the incipient pollution of the network. Indeed, Selwyn and Laszlo recognize that "PSTN congestion can *potentially* occur at each of ...three points in the public network."⁵⁶ It is correct to characterize these difficulties as systemic.

ENGINEERING ASSUMPTIONS

Throughout their document, Selwyn and Laszlo explicitly and implicitly malign the abilities and reputation of the nation's telephone engineers. For example, they allege that the "problems identified by the BOC [Bell Operating Company] studies are primarily attributable to inadequate planning and/or inefficient engineering."⁵⁷ Elsewhere, they imply the intentional selection of inappropriate and data-unfriendly technologies.⁵⁸ These observations ignore the fact that data transmission was not a primary goal of the designers of the public switched telephone network. Hopefully, they recognize the success of these engineers in building a network that satisfies its intended purpose: carrying voice traffic.

The author's dismissal of the premises of fundamental telephone network design principles affects the strength of their argument in many ways. For example, Selwyn and Laszlo acknowledge that "the cost of operating the PSTN and many of its components is sensitive to the *peak demand* placed on each network resource and to the relationship between that peak demand and the aggregate capacity of the individual network components."⁵⁹ This pinpoints one of the problems of telephone network design: changes in peak demand do affect individual network components.

Consider the following scenario. We observe a shift in the traditional peak demand from 4:00 PM or 5:00 PM to 10:00 PM or 11:00 PM. We note, based on the

⁵⁶ Selwyn and Laszlo, January 22, 1997, page 9.

⁵⁷ Selwyn and Laszlo, January 22, 1997, page vi.

⁵⁸ Selwyn and Laszlo, January 22, 1997, page vii.

concentration of the traffic, that this is attributable to the Internet service industry. A critic taking a simplistic view of network engineering uses this statistic to argue – erroneously – that the effects of Commercial Internet Service Industry traffic are negligible or even positive, because it might represent use of an otherwise underused or dormant network. We cannot say with certainty that this temporal shift is not a temporary statistical aberration that will change again when Internet users worldwide begin to interact with these switches around the clock.

However, if we look closer, we also note that the new peak demand is virtually a complete order of magnitude greater than peak demand in the absence of Commercial Internet Service Industry traffic. The Internet related peak represents near saturation of the switching capacity. Line access elements are engineered at concentration ratios ranging from 4:1 (in heavy business areas) to 8:1 (in rural areas). These elements, of course, have not been engineered to support the five-fold or more increase in usage that has been recently encountered in some switches.

How many 911 emergency calls must be blocked at the switch before we acknowledge the effect of the Commercial Internet Service Industry in its peak demand mode? How can we logically refuse to accept the need for remediation, which should be paid for by the agency causing the impact?

Selwyn and Laszlo note that all ISPs could be provided with trunk port capacity.⁶⁰ They suggest that some ISPs may avoid this arrangement due to tariff penalties imposed by the LECs. This statement does not consider the fact that ISPs desire Call Forwarding and individual channel testing, special services that cannot be provided at present with T-1 trunk ports.

Selwyn and Laszlo state that PBX trunk groups that support even full-capacity usage

⁵⁹ Selwyn and Laszlo, January 22, 1997, page 11.

⁶⁰ Selwyn and Laszlo, January 22, 1997, page 30.

have existed in the context of telephony for decades without causing any "meltdown" of the local telephone network.⁶¹ There is a specific reason why comparable per-trunk traffic loads on lines used for data traffic have a greater impact than voice traffic: the longer holding times with Internet.

Interoffice trunks often are engineered along several paths between any pairs of central offices. Occasional spikes are induced by special circumstances, such as a very large number of voice calls for local radio station call-in contests. Unlike these spikes, the surge in demand caused by Internet calls is not intermittent and occurs on a regular basis, leading to local and toll network congestion. Selwyn and Laszlo point out that traffic capacity can be augmented readily and blame LECs for failing to provide adequate interoffice facilities, ignoring the fact that the augmentations (fiber optics and switch processor) require incremental investment without corresponding incremental revenues.

Selwyn and Laszlo justify much of their discussion of switches and switch capacities with reference to one particular switch, the DMS-100. Selection of this switch biases their analysis unreasonably, because this particular switch offers certain data-traffic-related features. In any event, it is not as widely used at present in the industry as are many other switches. A survey of company representatives indicated that although up to approximately 50% of NYNEX's switches might be DMS-100 switches, this was not a widespread circumstance in the industry. Cincinnati Bell reported that no DMS-100 switches were currently in use in their company, while US West estimated that fewer than 10% of their switches were DMS-100. Pacific Bell reported that only 30% of their switches were DMS-100s, while GTE reported 20%, Southern New England Telephone reported 13% and Ameritech reported 47%. While it may be convenient to suggest alternative equipment, someone must pay to put it in use. Moreover, many of the data options claimed by Selwyn and Laszlo are unproven at present.

⁶¹ Selwyn and Laszlo, January 22, 1997, page 18.

Fallacious Analogies

In one section of their essay, Selwyn and Laszlo suggest a comparison between the telephone industry and the United States government postal service. For the moment, and purely for the purposes of this discussion, we do not focus on the obvious differences in profit motivation and enabling legislation. Instead, we examine a separate issue, raised by Selwyn and Laszlo's statement that "no one has ever seriously suggested that large volume mail recipients should pay an additional fee for receiving such mail."⁶²

In fact, just such a suggestion is transformed into a demand every day. As one example, consider that the postal service insists that telephone companies and other large volume mail recipients must use a post office box address for deliveries. There also is an implicit, and substantial, additional cost of managing mail sorting facilities within large companies because the postal service will not deliver mail to individuals. Nor will the postal service forward an individual's mail independent of a relocation of the entire company. The postal service exercises volume-based and value-based discrimination in every aspect of their interaction with the public, from their prejudicial pricing of junk mail to their foray into the courier delivery market and electronic mail validation. Finally, the post office does indeed adjust charges indirectly to consider volume: postal rates are based on the weight of the envelope or parcel.

On The Other Hand

While denying the true magnitude of its impact, Selwyn and Laszlo do acknowledge the existence and general nature of the problem of the Internet service industry. They recognize that "ISPs, like IXCs, use the ILEC network to aggregate traffic throughout a

⁶² Selwyn and Laszlo, January 22, 1997, page 23.

LATA for delivery to one, or at most a few, points of presence."⁶³

Summary

The document produced by Selwyn and Laszlo is abusive in tone and confrontational. The document's misapplication of statistical analysis is puzzling and misleading, to say the least. Further consideration of its conclusions and recommendations is unwarranted.

⁶³ Selwyn and Laszlo, January 22, 1997, page 17.

Technical Options

Introduction

Paul Misener is the Manager of Telecommunications and Computer Technology Policy at Intel and the chairman of the Internet Access Coalition Steering Committee. One journalist has quoted Mr. Misener as downplaying the impact of the Internet on the PSTN. "Long term, it has the potential to be a problem. But long term you'll also see alternative means of getting on the Internet," he said."⁶⁴ As is evident from the information presented in this report, the Internet is a problem in the short term as well as the long term. However, Mr. Misener is correct when he suggests that many of these problems can be corrected through alternative means of access.

Amir Atai and James Gordon provide a clear, concise summary of the technical options available to telephone industry professionals in their efforts to maintain the integrity of the PSTN in the face of the problems described in this report.

Internet solutions may be broadly characterized according to whether they are implemented in the access switches of the PSTN, or in the inter-office trunking network. Trunking solutions generally attempt to reduce stress on the PSTN by de-loading the switches as far as possible, and by trunking Internet traffic more intelligently. Trunking solutions, however, do not address the central problem of Internet traffic, which is that the PSTN is not designed to efficiently carry packet data traffic. Access solutions do address this problem. They attempt to siphon off Internet traffic at the edge of the PSTN, before it enters PSTN switch and trunk facilities. Once the Internet traffic is separated from voice traffic, it is then routed onto data networks, where it can be carried very efficiently. Access solutions have far more long term potential to reduce the cost of carrying Internet traffic, and for this reason are likely to form the basis for any long-term network solution.⁶⁵

⁶⁴ Krapf, "Why the 'Net," December 1996, page 37.

⁶⁵ Atai, Amir and Gordon, James, "Impacts of Internet Traffic on LEC Networks and Switching Systems," Bellcore Document OOC 1013, Morristown: Bell Communications Research, 1996, page 3.

Amir and Gordon continue by proposing an outline of solutions. Their outline delineates two categories of activities: trunking solutions and access solution. We will use this framework in our discussion of technical options available to the telephone industry.

Trunking Solutions

DEDICATED TRUNKS

The PSTN was not designed to serve customers occupying system capacity for 30 minutes in each hour. Rather it was designed to handle an average of 4 CCS to 6 CCS or approximately 6 to 10 minutes of use during the busy hour. As the Commercial Internet Service Industry grows, LECs will be forced to build interoffice trunks until data traffic starts to move off the switch. As long as pricing structures remain as they are at present, the costs for these trunks will be passed to the entire customer base in the form of increased costs for flat rate services, to the extent allowed by state Public Utility Commissions or Public Service Commissions. In some cases, the LECs would be forced to simply absorb the losses because of actions by state commissions.

There are two related alternatives to addressing the trunking problem. Both require developing trunking facilities at trunking end-offices. The first option would require an ISP to have trunks foreign-exchanged from a given office. In essence, this would require the location of a modem pool at the ISP's POP.

The other option would require the LEC to deploy a modem pool or remote access server at its facilities and to sell frame relay trunks to various customers. "The LEC can concentrate circuit-mode traffic from many dialed connections onto a single high-speed packet-mode connection, and use a frame relay or ATM trunk to carry the traffic to an ISP."⁶⁶ The ISP would have to decide to buy either the service or the foreign exchange trunks.

⁶⁶ McQuillan, December 1996, page 15.

Alternatively, another solution would be for LECs to build an ISP-specific trunk group that would overflow to the same group that the voice network would overflow. While technically feasible, this approach would be commercially untenable.

ROUTING / NUMBERING SOLUTION

This type of solution dictates that a LEC program a switch to recognize that the destination of a particular call is an ISP. The solution requires significant coordination to operate as intended. For example, for the solution to have its full impact, all calls to an ISP must be directed to a specific, pre-advertised number. New ISPs must register as ISPs when they connect to the PSTN and make appropriate arrangements with the LEC. Next, the LEC must ensure that their switches can support such programming, either as they are configured or with supplementary investment. Finally, the LEC must perform the necessary programming.

Access Solutions

PACKET MODE ISDN

More radical ideas focus on getting the user off traditional dial connections. One approach is to use ISDN, but instead of circuit-mode ISDN, which is just a faster modem, use packet-mode ISDN. ...There is something peculiar about ISDN users of the Internet: They always call the same phone number – the ISP's ISDN number. They do not really need the public switched network for that and, in fact, it is a tremendous waste of resources.⁶⁷

As Ray Albers, Vice President of Technology Planning for Bell Atlantic, has observed:

It's ... an economic problem. If our traffic engineers are keeping up with that [traffic analysis] and there's not a huge growth spurt, then you won't really get too much blockage. But it means that they're continually throwing money at the problem.⁶⁸

⁶⁷ McQuillan, December 1996, page 15.

⁶⁸ Krapf, Eric, "Why the 'Net,'" December 1996, page 37.

PRE-SWITCH ADJUNCT

Many of the concerns now being raised about switch congestion caused by Internet usage arise because virtually all residential users today connect to the Internet -- a packet-switched data network -- through incumbent LEC switching facilities designed for circuit-switched voice calls. The end-to-end dedicated channels created by circuit switches are unnecessary and even inefficient when used to connect an end user to an ISP. ...We invite parties to identify means of addressing the congestion concerns raised by incumbent LECs, for example by deploying hardware to route data traffic around incumbent LEC switches.⁶⁹

One obvious solution to the problem identified by the FCC is to reroute traffic before it impacts the switch and the network. One method of doing just this involves deploying hardware to route data traffic around the ILEC's switches. Specific commercial product offerings that would provide this functionality include Lucent's Access Interface Unit for the 5 ESS, Nortel's Access Node, and DSC's Litespan/Mega-hub. As a manager at Nortel observed, "The objective here is not to figure out how to have voice and data coexist, but how to split data away from voice and put it on a dedicated network."⁷⁰

One large LEC is deploying and offering such a new packet based technology service for Internet and Intranet access applications. The new service offers Internet Service Providers and Intranet (corporate and university) service providers a high quality packet service as an alternative to the circuit switched network for providing connections between end users and the Internet/Intranet access services. They call this offering Internet/Intranet Transport Service ("IITS").

With IITS, end-user calls to ISPs are routed to and through the IITS data platform rather than over the company's circuit switched network. An intelligent peripheral device

⁶⁹ FCC 96-488, ¶313, page 138.

⁷⁰ Kopf, David, "Nipping 'Net calls in the bud," *America's Network*, March 1, 1997, page 48, quoting Jim Dondero, senior manager of network solutions for Nortel.

located in the end office of the end user is used to provide the network termination. The device is programmed to recognize the event when an end user makes a call to their ISP. The device then routes the call to a "Data Gateway," which performs the modem functions that typically are performed by ISPs in a circuit switched network. From the Data Gateway, the call, now in a data format, goes to the Data Switch which formats the call data stream into "frame relay" packets for transport to the ISP.⁷¹

This approach offers promise of alleviating interoffice facility and terminating switch congestion through investment in adjunct equipment. However, as with other technologies, it is difficult to justify the investment because the investment does not generate any compensatory revenues.

PACKET SWITCHING WITH FRAME RELAY AND ATM

To alleviate switch congestion, ISP access could be moved to packet switched networks that use Frame Relay and ATM technologies within the backbone. Frame Relay technology could be offered using existing Committed Information Rates and ATM, using the ability to support guaranteed Quality of Service concepts for delivery of different traffic types.

ASYMMETRIC DIGITAL SUBSCRIBER LINE

Asymmetric Digital Subscriber Line ("ADSL") technology offers an alternative to the use of POTS technology or ISDN lines for data flows between central offices and subscribers. The concepts underlying ADSL are straightforward. The volume of traffic flow generally is greater to typical users than from typical users. That is, the data flows tend to be asymmetrical. ADSL strips a portion of the bandwidth from existing facilities and use this bandwidth to provide a data connection for subscribers that is

⁷¹ See Kopf, March 1997, for specific details on the deployment of this technology within Southwestern

asymmetrical. This asymmetry is used to increase the effective bandwidth made available for data transfers.⁷²

In simplest terms, ADSL is composed of two primary sub-systems. The first is the ADSL transmission unit-central office ("ATU-C"). This consists of an ADSL modem and an access module located in the LEC central office. The access module interfaces the modem to a variety of digital service signals with which ADSL can interact.

The second component is the customer's ADSL transmission unit-remote ("ATU-R"), which may be connected to a television, computer or other application device. In the ATU-R terminal, the voice band circuit is input to a "POTS Splitter." The data signals are encoded and modulated. The resulting data and POTS signals are then combined (or multiplexed) on the same line. After the transmission to the ATU-C terminal over the transmission circuit, the operation is reversed to recover separate POTS and data signals. The POTS signals are routed through the switch in a normal manner, while the data signals are routed to a data network.

Despite its theoretical benefit, implementation of ADSL has been slow to date. Such high-bandwidth access technologies require end user investment in ADSL modems, which are priced significantly higher than traditional modems, and related software and equipment. This has caused some resistance as has been experienced by LECs in their attempts to migrate users to Basic Rate ISDN service.

Moreover, there are still problems to be resolved in the deployment of this technology, which actually consists of multiple technologies termed generically "xDSL." There are many technical issues surrounding ADSL related to modem technologies, customer interfaces, loop lengths, transmission effects and backbone network. There are various

Bell Telephone.

⁷² For a detailed technical discussion of ADSL technology, see: Gibson, Jerry D. (editor-in-chief), *The Communications Handbook*, CRC Press (published in cooperation with IEEE Press), 1997, especially chapter 34 (pages 450 and following) by John M. Cioffi).

“flavors” of xDSL and each has its own problems.

These solutions will be costly initially and therefore will diffuse slowly. These solutions should be deployed in 1998 with the service taking off with better costs in 1999. Despite the uncertainties, it is clear that ADSL offers a viable long-term solution for data transfer.

CABLE MODEMS

Cable modem systems use either a coaxial cable or a hybrid fiber-coaxial (“HFC”) transport medium and a media access control (“MAC”) device to provide shared bandwidth to customers. This approach to high-speed data access is attractive, at least in theory, in areas equipped with the necessary outside plant. Customers use specialized modems that currently are more expensive than standard modems, presumably due to their smaller volume of sales. As noted by Atai and Gordon, to a great extent this is a technology that is still in development.

Nevertheless, the industry already has begun to experience the worst of both worlds in the diffusion of cable modems within some existing cable companies. Under these arrangements, an Internet subscriber can use a telephone line to issue requests for data downloads, while receiving the data downloads over a cable modem. While this does shift some one-way traffic to another network, the telephone line still remains in use.

WIRELESS SOLUTIONS

Wireless solutions for Internet require substantial end user investment. For example, the cost for a landline connection cable for a typical PCMCIA modem operating at 28.8 kbps is approximately \$2. Given the ubiquity of the RJ-11 standard within North America, the effective price for such a cord is zero. Indeed, on some days, it seems

that every manufacturer of any device that looks like it could be connected to the PSTN provides a free RJ-11 cord to do so and the cords gather dust in ever growing piles.

In contrast, the price for a wireless connection cable currently fluctuates around \$75, plus shipping and handling. Such cables are idiosyncratic in design, which will change quickly as more vendors enter the field. For the present, however, such cables are special order purchases.

Having spent \$75 for a cable, the user must also provide a wireless telephone or similar device. This represents a further investment for the user. Wireless service providers are positioned to offer wireless Basic Rate ISDN (for example, using W-CDMA) to meet the demands for Internet access and applications such as e-mail and groupware. Of course these solutions require investment by network providers as well.

Finally, having assembled the pieces, the user must confront the usage-sensitive rate structure of the wireless communications vendors. At 25 cents per minute, few people can afford to surf the 'Net for very long.

Summary

There are several potential solutions to the technical problems posed by Commercial Internet Service Industry access to the PSTN. Several options already are available to satisfy short-term demand. The options are being implemented where appropriate and cost justifiable. Adjustment of current tariff inequities will hasten the implementation of these solutions.

There is considerable engineering and development activity underway to identify the most viable long-term solutions, from the perspective of the long-term health of the PSTN and the perspective of the Internet. Our brief summary merely highlights the directions of this research. Nevertheless, we believe it serves to focus attention on the

prospects for future solutions to the Internet problem.

In the long term, the best and perhaps only solution is to migrate at least high-end Internet users from the PSTN completely. Again, the knowledge that inequities in tariffs will be adjusted and that there are funds available to pay for such development is certain to expedite these efforts.

However, as long as current pricing arrangements are in effect (i.e. the ESP exemption), the time it takes for these technologies to be adopted is artificially lengthened. The ISPs in our traffic study generated ... 608 minutes of use per line over [a] 24-hour period. Based on payment of \$17 per month per line, the ISPs pay 56 cents per day, or \$.0009 per minute of use. This contrasts with Bell Atlantic's interstate, switched access charge of approximately 2 cents per minute. In effect, ISPs are paying 1/22 of the equivalent per minute rate paid by IXC's during a business day. At these levels, ISPs would have little incentive to adopt voluntarily alternative forms of access.⁷³

⁷³ Report of Bell Atlantic, March 1996, page 5.

Paying for the Changes

Introduction

Currently Internet infrastructure is a highway of information paths with no usage-based fee. Typically a connection fee is charged based on the size of the data "pipeline" connecting a server to The Internet. Whether or not to charge for network services is a complex question. A flat charge for services will result in large inefficiencies in usage because the services providing low value might require as much bandwidth as the ones providing relatively higher value.⁷⁴

There is no question that access to the Internet comes with a cost. Recently, this cost was acknowledged in the deliberations of FCC CC Docket No. 96-45, which considered the matter of universal service. The Joint Board's recommendations regarding the availability of special services for schools and libraries and for rural health care providers are evidence of the costs and the need for public support.

We agree with the intent and necessity of underwriting the costs of Internet access for these institutions. The Joint Board's recommendations regarding the public good are compelling and proper, and the concept of an explicit subsidy for those purposes is reasonable. However, there is no need to underwrite general-purpose, commercial use of the Internet, particularly not with hidden subsidy. The argument for explicit subsidy of a profitable industry is much less compelling than the argument for explicit subsidy of our children's education and the nation's health care.

We do not advocate wholesale regulation of the Internet. Rather we recommend rational regulation of the Commercial Internet Service Industry's access to the PSTN. The FCC rules could be used to create more effective incentives for the deployment of services and facilities. This in turn would encourage the use of more efficient methods

of transporting data traffic to and from end users, by designing rules that promote the development of emerging packet-switched data networks.

The nation's LECs are incurring significant expenses adding network capacity to accommodate existing ESP access architectures and need to recover those costs as they are incurred.

The catch, of course, is that no LEC wants to pay for the required solutions, arguing that they receive nothing in return. They're asking the FCC to levy access charges on ISPs, which, unlike long distance carriers, currently don't pay any fees to hook into the local network.⁷⁵

New Sources of Funding

The money needed to pay for these changes and enhancements to the network can be obtained from a variety of sources. New services such as Internet telephony, as well as real-time streaming audio and video services over the Internet, provide inspiration in the analysis of funding options.

Services that use real-time streaming of video services over the Internet include broadcast style services such as PointCast™. Users of this type of service as well as some audio services often are left on for hours, sometimes all day, for the price of a single local call. PointCast™ offers an advertiser and subscription supported service that a broadcaster can use to push a customized load of information to the desktop.

E-mail is also the broadcast medium for advertising-supported services offered to users of more popular browsers. Bell Atlantic's News Center, for example, gathers news releases of interest to users and provides Internet site links to those news releases.

⁷⁴ Gupta *et al*, page 2.

⁷⁵ Krapf, Eric, "ISPs: A Growing Concern" [Editorial], *Business Communications Review*, December 1996, page 12.

On-line advertising could offset new costs that would be incurred by ESPs.

Trends in Internet Advertising – The Georgia Tech Surveys

The Georgia Tech Research Corporation has conducted surveys for several years on various aspects of the commercialization of the Internet. In their October 1996 industry survey, they found that 75.5% of the “webmasters” surveyed do not provide advertising on their sites, while 6.8% reported charging more than \$100 per week.⁷⁶ As the authors noted, this does not seem significant until placed in the context of previous results. This figure represents a 600% increase in eighteen months.

It is not unreasonable to expect that advertising will play an increasingly significant role as an income generator for the Commercial Internet Service Industry. The same industry survey (the sixth in their series) notes that the average age of users is 34.9 years and the mean average household income is US\$ 60,800, an ideal demographic profile for advertisers. Approximately 64% of the respondents report that they accessed the Web from their home, an increase from the 55% reported in the previous survey.

Interestingly, the survey notes a steady increase in the percentage and number of users who pay for their own Internet access. The authors note that educational access had dropped to 13.4% in the latest survey from 24.5% in the fourth survey. They suggested that this finding “supports the notion that Internet access is becoming a personal resource and not a heavily governmental and educational subsidized resource.”⁷⁷

Almost 37% of the survey’s respondents stated that they enjoy / use / engage in the Web on a daily basis rather than watching television. Twenty-nine percent stated that

⁷⁶ http://www.cc.gatech.edu/gvu/user_surveys/survey-10-1996/bulleted/.

⁷⁷ “Who Pays for Access,” http://www.cc.gatech.edu/gvu/user_surveys/survey-10-1996/bulleted/.

the Web replaced television in their lives more than once a week. These are compelling arguments for the inevitability of advertising. No lesser authority than Bill Gates has made a compelling case for just such financing of the Internet.⁷⁸

Summary

Gupta *et al* have suggested that:

A well designed priority pricing mechanism has the potential to handle these problems. The basic idea is to levy tolls on the users of the system's capacity ...Thus the potential computing power could (or perhaps should) be used for development and implementation of a more real-time pricing system.⁷⁹

There are clear and compelling reasons, both technical and economic, for establishing an equitable pricing mechanism for Commercial Internet Service Industry access through the PSTN. We encourage the Commission to implement such a mechanism to ensure the orderly growth of a data network, while maintaining the stability of the underlying voice network.

⁷⁸ Gates, III, William H., *The Road Ahead*, (second edition), New York: Penguin Books, 1996. See especially the CD-ROM version of the text, which contains examples of the technology.

⁷⁹ Gupta *et al*, page 3

Conclusion

This report should not be taken as a desire to discourage Internet usage, but to assist in development of an environment in which the telecommunications infrastructure could be a major and permanent portion of the fabric of provision of Internet access. As the FCC observed:

However, the development of the Internet and other information services raise many critical questions that go beyond the interstate access charge system that is the subject of this proceeding. Ultimately, these questions concern no less than the future of the public switched telephone network in a world of digitalization and growing importance of data technologies. Our existing rules have been designed for traditional circuit-switched voice networks, and thus may hinder the development of emerging packet-switched data networks. To avoid this result, we must identify what FCC policies would best facilitate the development of the high-bandwidth data networks of the future, while preserving efficient incentives for investment and innovation in the underlying voice network.⁸⁰

The best available incentive for investment is the potential for profit. As many industry observers have noted, the best long-term solution to the problems discussed here is to move the traffic off the PSTN and onto dedicated data lines. Under these conditions, as one of the observers noted, "Internet traffic would go from being a possible liability to a major asset. There's nothing wrong with that, and in fact if the 'Net is to thrive, there has to be something in it for whoever provides the local access."⁸¹

We recommend discontinuing the temporary exemption of the Commercial Internet Service Industry and removing the implicit subsidy of this flourishing and profitable industry. We recommend shifting the cost burden of maintaining the Commercial Internet Service Industry's infrastructure from the public at large to the users of the services. We recommend that cost should be allocated and prices charged based on

⁸⁰ FCC 96-488, ¶311, pages 137-138.

⁸¹ Krapf, Eric, "ISPs: A Growing Concern," December 1996, page 12.

usage of the national PSTN resource.